

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: West, *et al.*

Art Unit: TBD

Serial No.: TBD

Examiner: TBD

Filed: 5/24/2001

Attorney Docket: COM002.1

For: Bandwidth Efficient QAM on a TDM-FDM System for
Wireless Communication

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
BOX PATENTS
Washington, DC 20231

MAILING CERTIFICATE UNDER 37 C.F.R. §1.8(A)

I hereby certify that on this date, the above correspondence is being deposited with the US Postal Service as "Express Mail Post Office to Addressee" addressed to: Box Patents, Assistant Commissioner for Patents, Washington, DC 20231.

Karen Fabritius
Karen Fabritius

5/24/01
Date

Dear Sir:

Prior to examination on the merits, please enter this preliminary amendment to the specification and claims.

In the specification:

ITEM ONE:

On page 1, please delete the paragraph beginning on line 4 and insert in its place the following paragraph:

This application is a continuation of and incorporates by reference U.S. Patent Application No. 09/295,660, which application claims benefit of U.S. Provisional Application Serial No. 60/107,934 filed November 11, 1998, also incorporated herein by reference.

The following marked-up version of the paragraph demonstrates changes to the previous version.

This application is a continuation of and incorporates by reference U.S. Patent Application No. 09,295,660, which application claims

benefit of U.S. Provisional Application Serial No. 60/107,934 filed November 11, 1998, also incorporated herein by reference.

ITEM TWO:

On page 4, please delete the paragraph beginning on line 6 and insert in its place the following paragraph:

Another shortcoming of prior art devices is their limited ability to transmit only one type of information format (e.g. voice only, data only, voice and data) on a given channel. Because the prior art systems require the full channel bandwidth to transmit and because the receiving device must be programmed to recognize the type of information that is being transmitted on that channel, normally only one type of information can be transmitted on the channel at any given time.

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Another shortcoming of prior art devices is their limited ability to transmit only one type of information format (e.g. voice only, data only, voice and data) on a given channel. Because the prior art systems require the full channel bandwidth to transmit and because the receiving device must be programmed to recognize the type of information that is being transmitted on that channel, normally only one type of information can be transmitted on the channel at any given time.

ITEM THREE:

On page 28, please delete the paragraph beginning at line 7 and insert in its place the following paragraph:

Figures 8(c) through 8(e) illustrate base unit 102 operating in receiver mode. Fig. 8(c) provides a high level block diagram of the four sub-channel architecture. Signals from the terminal units are received by radio frequency (RF) receiving circuitry (not shown). A/D converter 840 receives the signal from the RF receiving circuitry and converts it to a digital signal, which is fed to each of the four sub-channel paths, 844, 845, 846, and 847.

The following marked-up version of the paragraph demonstrates changes to the previous version.

Figures 8(c) through 8(e) illustrate base unit 102 operating in receiver mode. Fig. 8(c) provides a high level block diagram of the four sub-channel architecture. [...] Signals from the terminal units are received by radio frequency (RF) receiving circuitry (not shown). A/D converter 840 receives the signal from the RF receiving circuitry and converts it to a digital signal, which is fed to each of the four sub-channel paths, 844, 845, 846, and 847.

In the Claims:

Please cancel currently pending claims 1 through 29 and add the following new claims.

30. (new) A method of accommodating pre-defined channels of differing bandwidths without substantial retrofitting of communication system components, each pre-defined channel having a center frequency, comprising:

when broad pre-defined channels are available, transmitting N independent communication signals to N mobile units over a single broad pre-defined channel, each independent communication signal being broadcast at a pre-defined offset from the center frequency of the broad pre-defined channel;

when only narrow pre-defined channels are available, each narrow pre-defined channel having 1/M bandwidth of the broad pre-defined channel, transmitting N/M independent signals to N/M mobile units over each of M narrow pre-defined channels, each of the N/M independent signals being broadcast at a pre-defined offset from the center frequency of the narrow pre-defined channels;

wherein the pre-defined offsets from the center frequency of the narrow pre-defined channels is a sub-set of the pre-defined offsets from the center frequency of the broad pre-defined channel.

31. (new) The method of claim 30 wherein a mobile unit can be configured to accommodate a narrow pre-defined frequency channel by tuning the mobile unit to a new center frequency, but not changing the pre-defined offset from the center frequency.

32. (new) The method of claim 30 wherein a mobile unit can be configured to accommodate a narrow pre-defined frequency by changing the pre-defined offset from the center frequency to which the mobile unit is tuned.

33. (new) The method of claim 30 wherein N is four and M is two.

34. (new) The method of claim 30 further comprising, time division multiplexing each sub-channel into two or more time slots.

35. (new) The method of claim 30 wherein N is an integer multiple of M.

36. (new) The method of claim 30 wherein a broad pre-defined channel is 25 kHz.

37. (new) The method of claim 36 wherein a narrow pre-defined channel is 6.24 kHz.

38. (new) A radio system capable of accommodating pre-defined frequency channels of differing bandwidths, each pre-defined frequency channel having a center frequency, comprising:

a data source providing at least N independent communication signals;

a transmitter coupled to the data source and configured to transmit N independent communication signals to N mobile units over N sub-channels of a broad pre-defined frequency channel when available;

each of the N sub-channels having a frequency offset from the center frequency of the broad pre-defined frequency channel, but falling entirely within the bandwidth of the broad pre-defined frequency channel, and no two of the N sub-channels having the same frequency offset;

the transmitter being configured to transmit M independent signals to M mobile units over a each of a N/M narrow pre-defined frequency channels when a broad pre-defined frequency channel is unavailable, wherein N is an integer multiple of M;

each of the M sub-channels for each of the plurality of narrow pre-defined frequency channels having a frequency offset from the center frequency of the narrow pre-defined frequency channel, but falling entirely within the bandwidth of the narrow pre-defined frequency channel;

wherein the frequency offsets for the sub-channels of the narrow pre-defined frequency channels comprise a subset of the frequency offsets for the broad pre-defined frequency channel.

39. (new) The radio system of claim 38 further comprising:

N mobile units, each mobile unit configured to receive one of the N independent communication signals by being tuned to a particular pre-defined frequency channel and a particular frequency offset.

40. (new) The radio system of claim 39 wherein a mobile unit can be configured to accommodate a narrow pre-defined frequency channel by re-tuning either the center frequency or the offset frequency.

41. (new) The radio system of claim 38 wherein each sub-channel is time division multiplexed.

42. (new) The radio system of claim 38 wherein N is four and M is two.

43. (new) The radio system of claim 38 wherein the offset frequencies comprise plus or minus 2.4 kHz and plus or minus 7.2 kHz.

44. (new) The radio system of claim 38 wherein the pre-defined frequency channels are assigned by a governmental authority.

45. (new) The radio system of claim 38 wherein the N/M narrow pre-defined frequency channels occupy contiguous bandwidth.

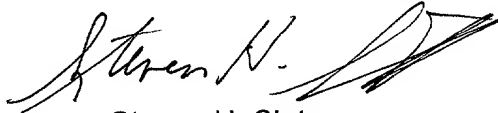
46. (new) The radio system of claim 38 wherein the data source is a public telephone network.

47. (new) The radio system of claim 40 wherein the mobile unit is configured via control signals broadcast by the base unit.

REMARKS

Applicants respectfully request examination on the merits of newly added claims 30 through 47. No new subject matter has been added through this amendment, but rather certain typographical errors in the specification were amended. Applicants respectfully submit the claims are in condition for allowance.

Respectfully submitted,



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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Randall J. West, et al. Art Unit: TBD
Serial No.: TBD Examiner: TBD
Filed: May 24, 2001 Docket: COM002.1
For: Bandwidth Efficient QAM on a TDM-FDM System for Wireless Communications

TRANSMITTAL OF FORMAL DRAWINGS

Assistant Commissioner For Patents
Washington, D. C. 20231

Attn: Official Draftsperson

Dear Sir:

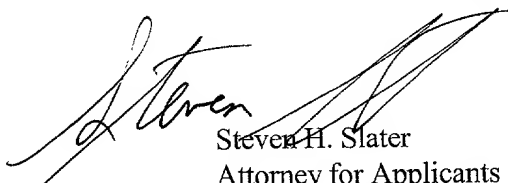
MAILING CERTIFICATE UNDER 37 C.F.R. §1.8(A)
I hereby certify that, on or before the undersigned date, the above
correspondence is being deposited with the U.S. Postal Service
as Express Mail in an envelope addressed to Assistant
Commissioner for Patents, Washington, DC 20231.

Karen Fabritius
Karen Fabritius

5/24/01
Date

Attached are eleven (11) sheets of formal drawings for the above-referenced application.

Respectfully submitted,


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FIG. 1a

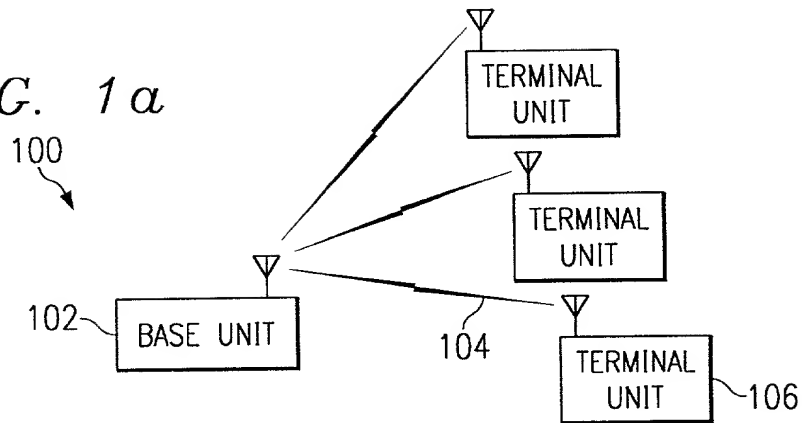


FIG. 1b

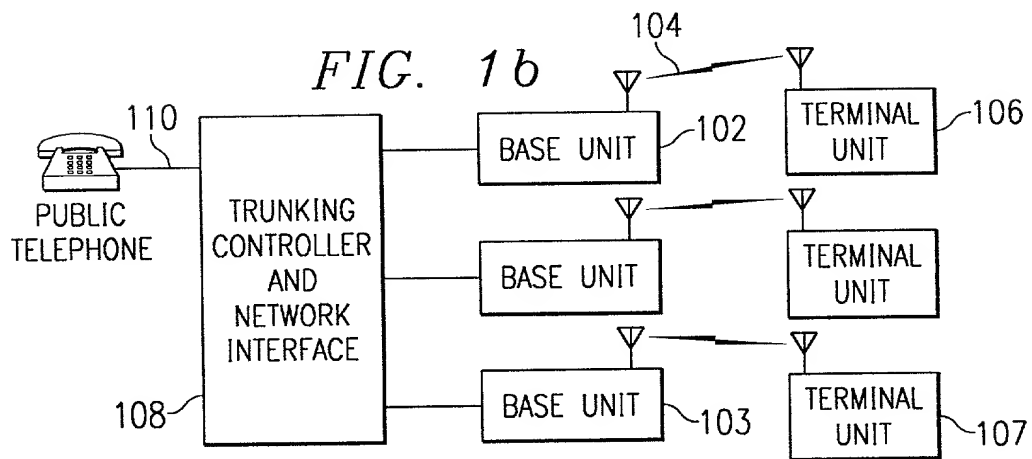
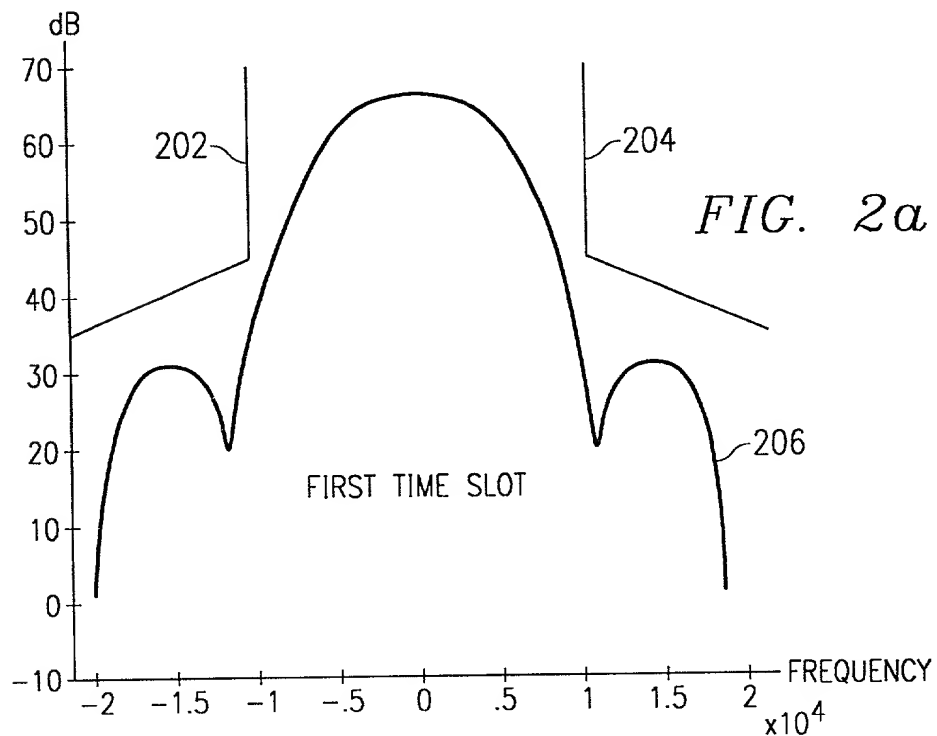
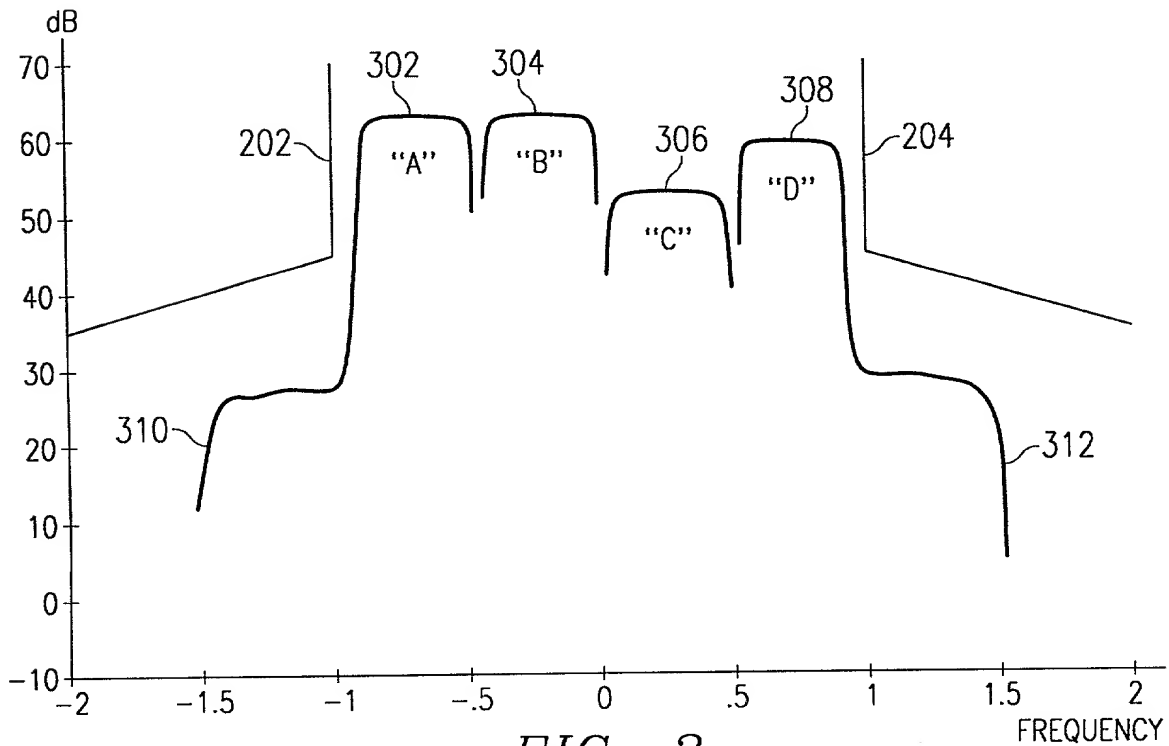
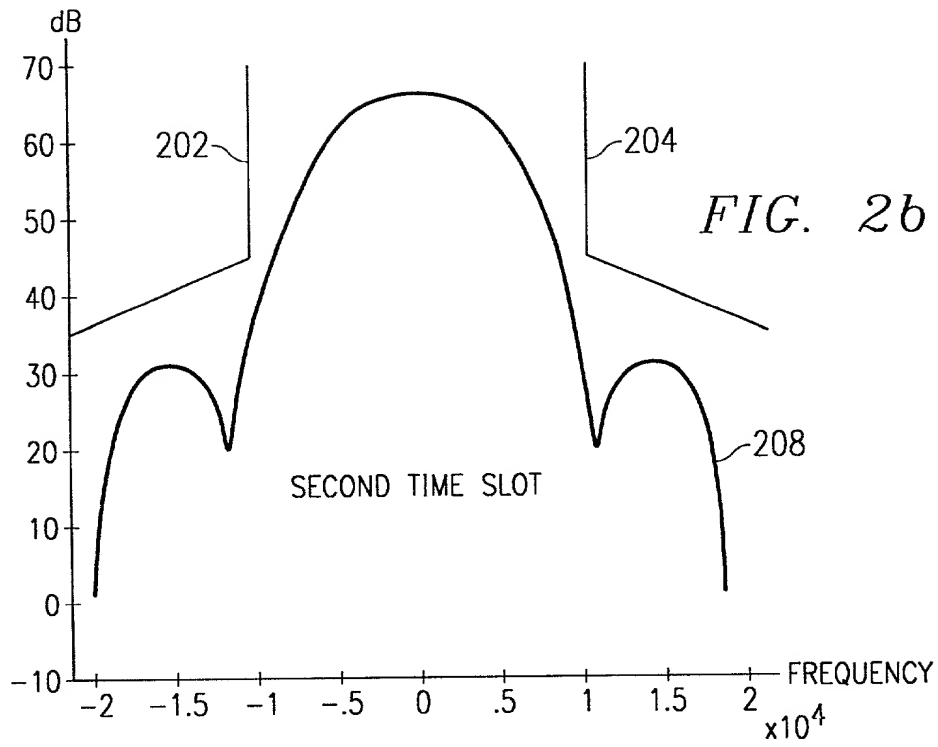


FIG. 2a





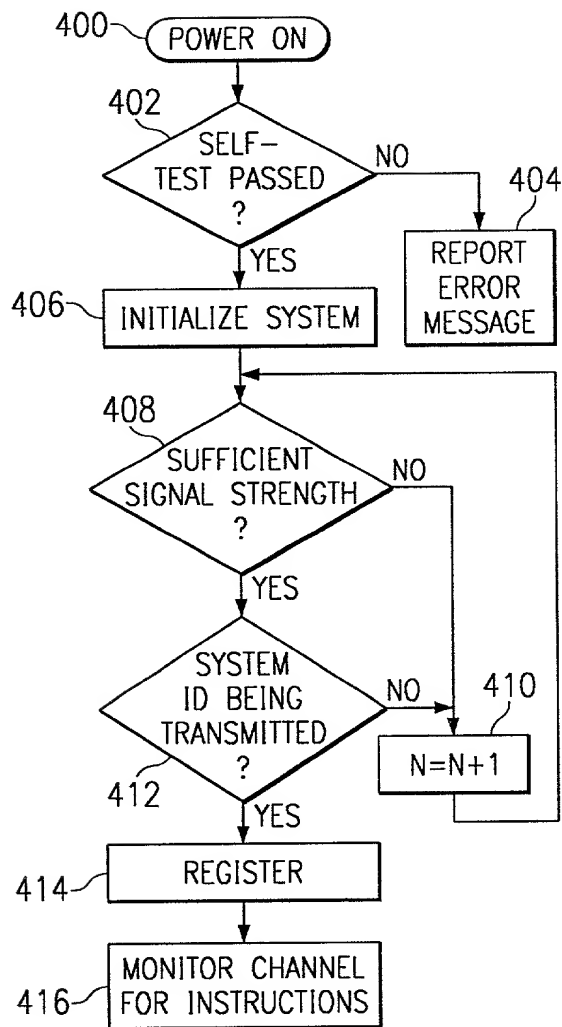


FIG. 4a

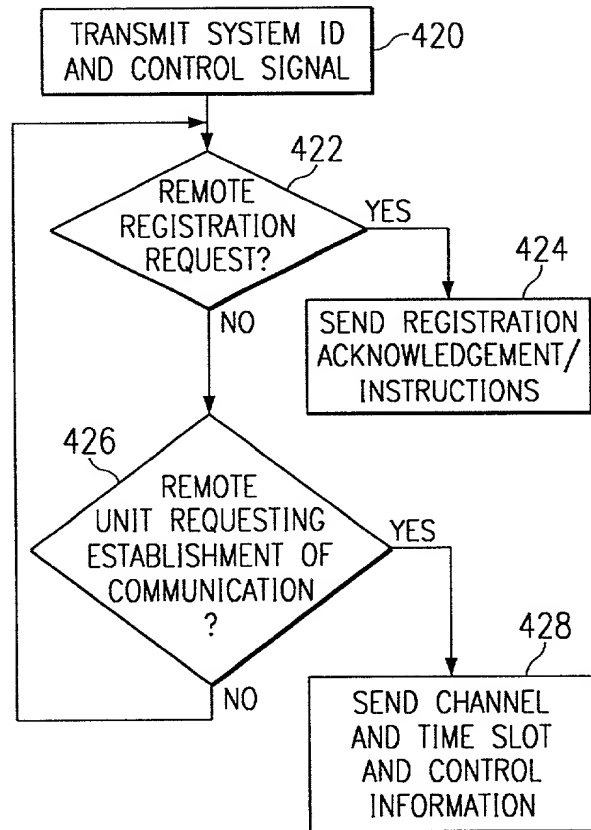


FIG. 4b

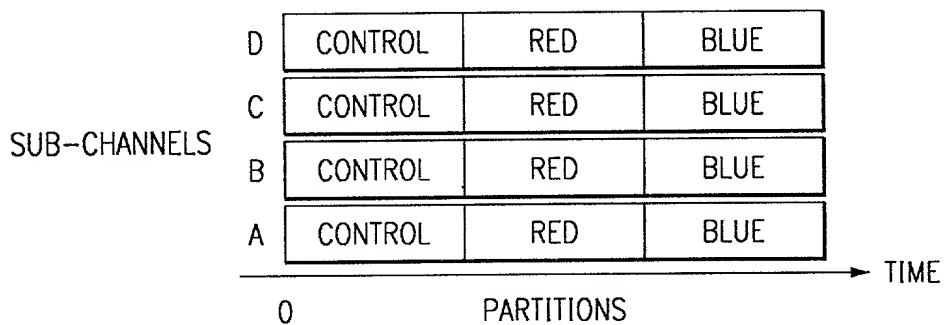
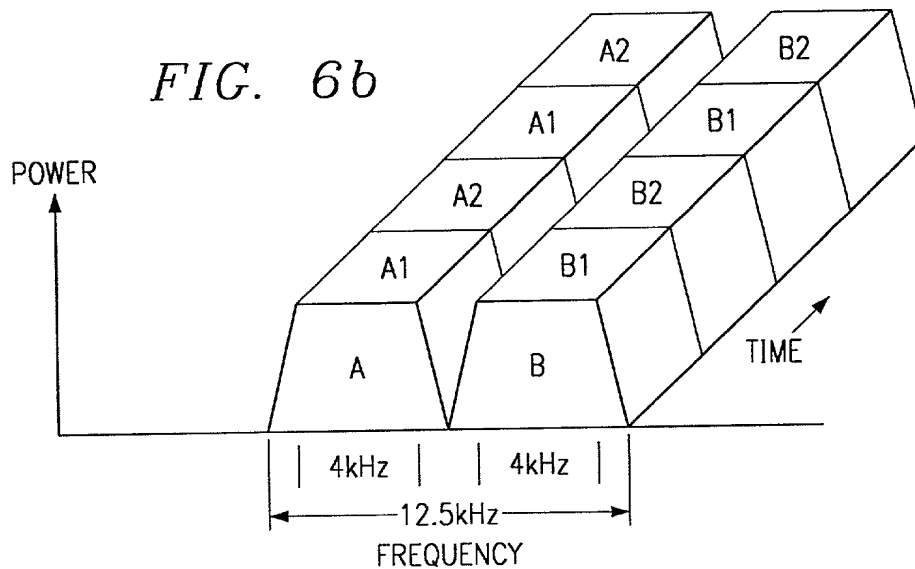
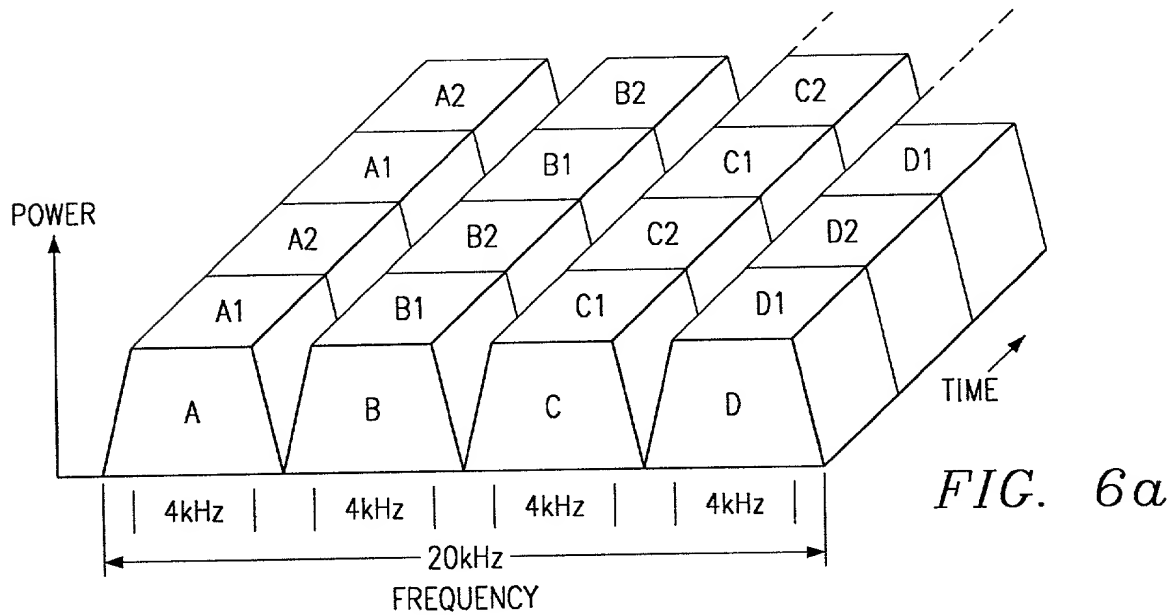
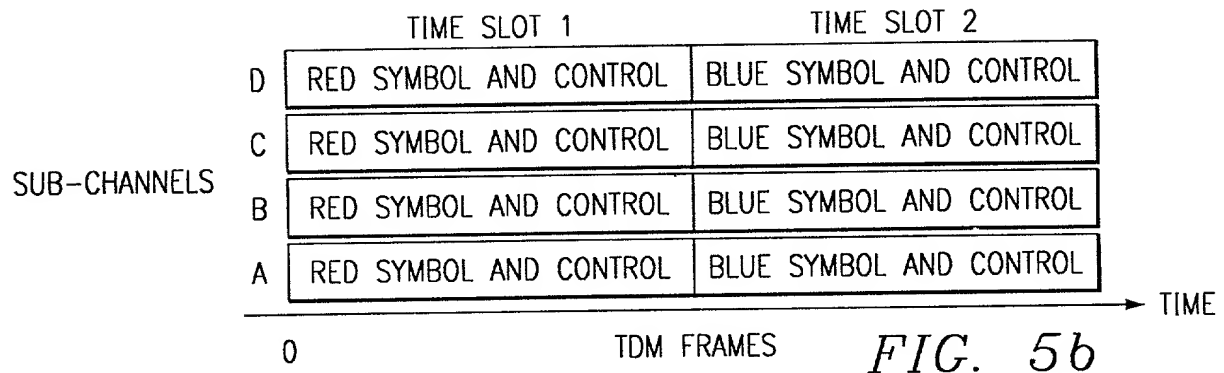


FIG. 5a



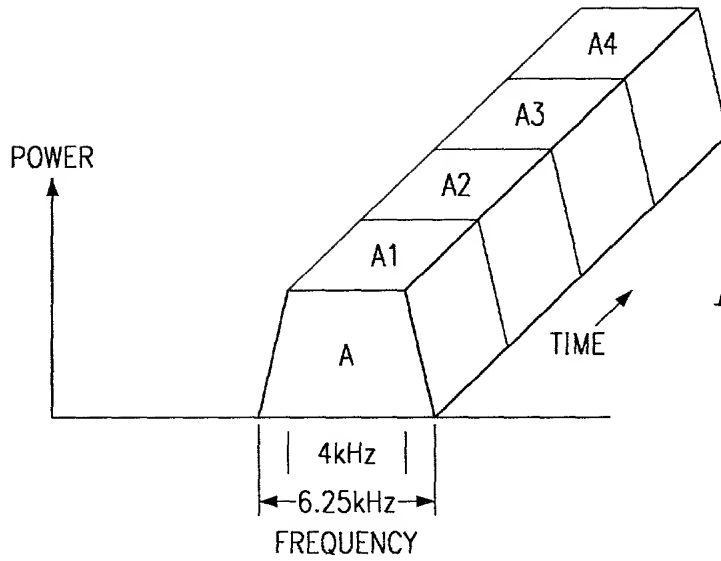


FIG. 6c

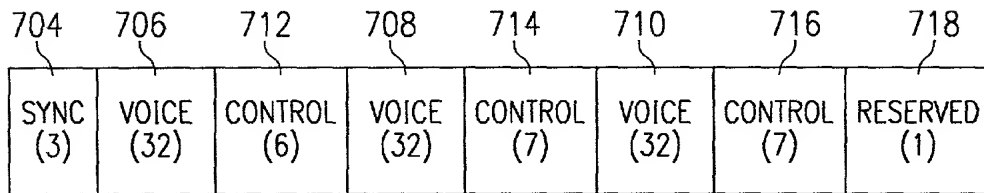


FIG. 7a

702

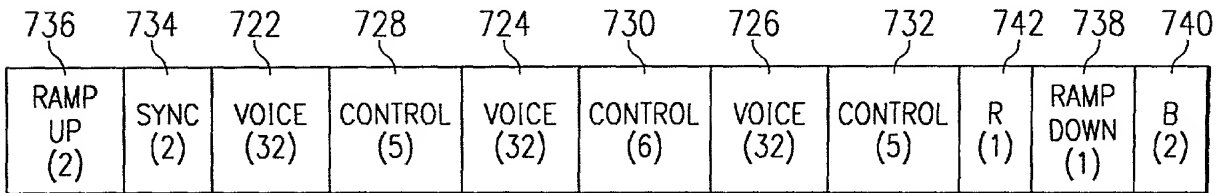


FIG. 7b

720

FIG. 7c

| STAR QAM, 30msec SLOT, OUTBOUND, LTR | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------|
| SLOT NUMBER | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | SUM BY |
| PRIMARY ERROR CONTROL WORD# | 0 | 0 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 7 | 8 | 8 | 9 | 9 | 10 | 10 | 11 | 11 | FUNCTION |
| LTR WORD# | 0 | 0 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 7 | 8 | 8 | 9 | 9 | 10 | 10 | | | |
| CRC BITS | 6 | 5 | 6 | 5 | 6 | 5 | 6 | 5 | 6 | 5 | 6 | 5 | 6 | 5 | 6 | 5 | 6 | 5 | 6 | 5 | 6 | 5 | 6 | 5 | 132 |
| LTR BITS | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 0 | 0 | 264 |
| LTR FREQ. EXPAN. | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 0 | 0 | 198 |
| SYSTEM CONTROL | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 29 | 29 | 234 |
| COUNTER/BATT. SAVE | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 48 |
| RED/BLUE DEFINITION | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 12 |
| INFORMATION BITS IN SLOT | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | |
| CODED BITS IN SLOT | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | |
| POWER CONTROL INCREMENT | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 72 |
| CODED PCI BITS IN SLOT | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 144 |
| TOTAL BITS IN SLOT | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 1920 |

FIG. 7c

| CATEGORY | b15 | b14 | b13 | b12 | b11 | b10 | b9 | b8 | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 |
|------------------|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|
| SERVICE OPTION | 0 | 0 | 0 | 0 | s11 | s10 | s9 | s8 | s7 | s6 | s5 | s4 | s3 | s2 | s1 | s0 |
| FREQUENCY | 0 | 0 | 0 | 1 | 0 | f10 | f9 | f8 | f7 | f6 | f5 | f4 | f3 | f2 | f1 | f0 |
| BASE SYSTEM GAIN | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | g6 | g5 | g4 | g3 | g2 | g1 | g0 |

FIG. 7e

| STAR QAM, 30msec SLOT, INBOUND, LTR | | |
|-------------------------------------|----|----|
| SLOT NUMBER | 0 | 1 |
| ERROR CONTROL WORD# | 0 | 1 |
| LTR WORD# | 0 | 0 |
| CRC BITS | 7 | 7 |
| LTR BITS | 12 | 12 |
| LTR FREQ. EXPAN. | 5 | 4 |
| SYSTEM CONTROL | 5 | 6 |
| SLOT COUNTER | 1 | 1 |
| POWER INDICATOR | 2 | 2 |
| INFORMATION BITS IN SLOT | 32 | 32 |
| CODED BITS IN SLOT | 64 | 64 |

FIG. 7d

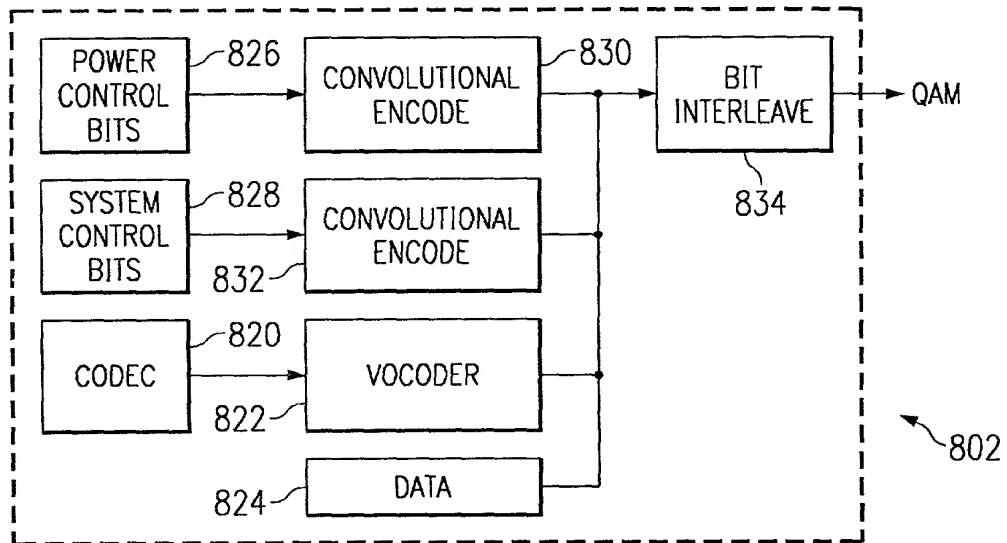


FIG. 8b

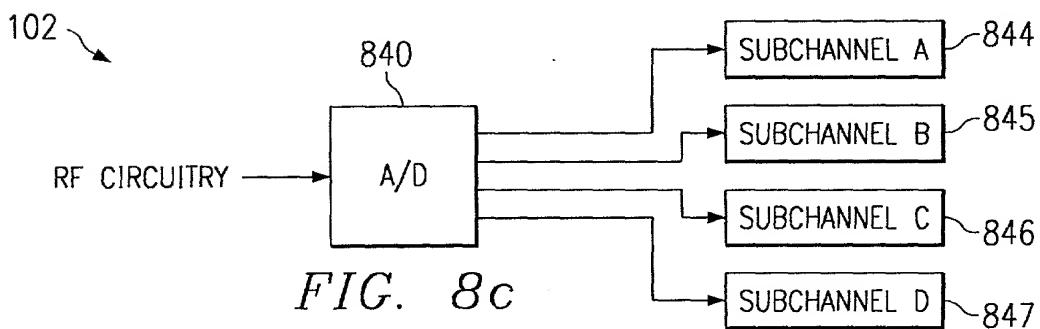


FIG. 8c

FIG. 8a

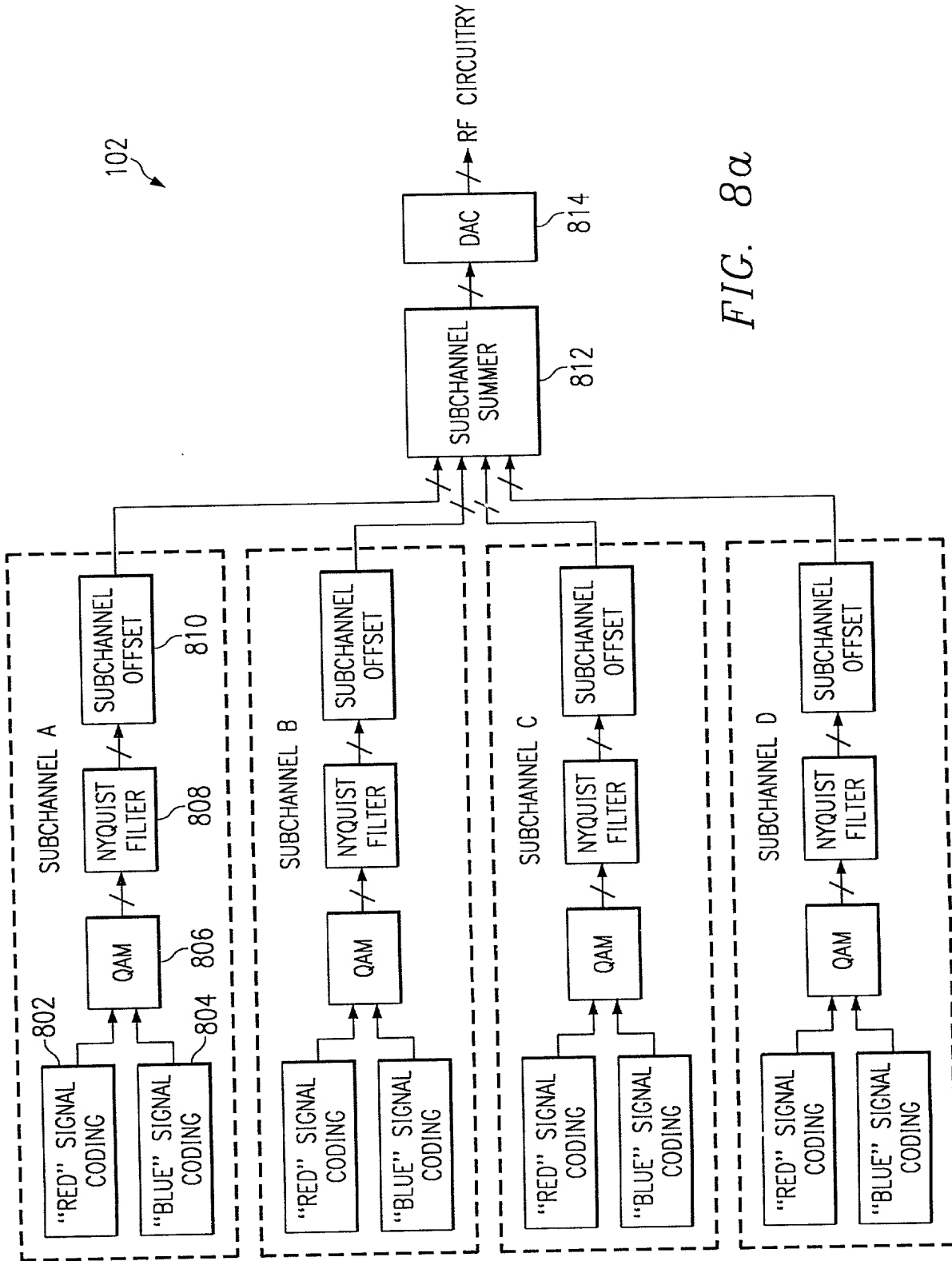


FIG. 8a

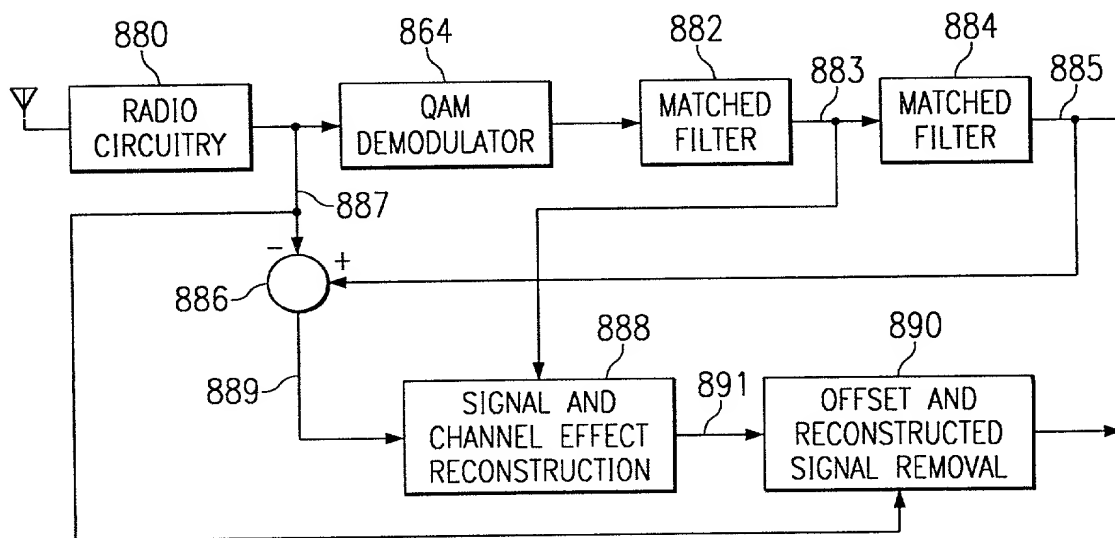
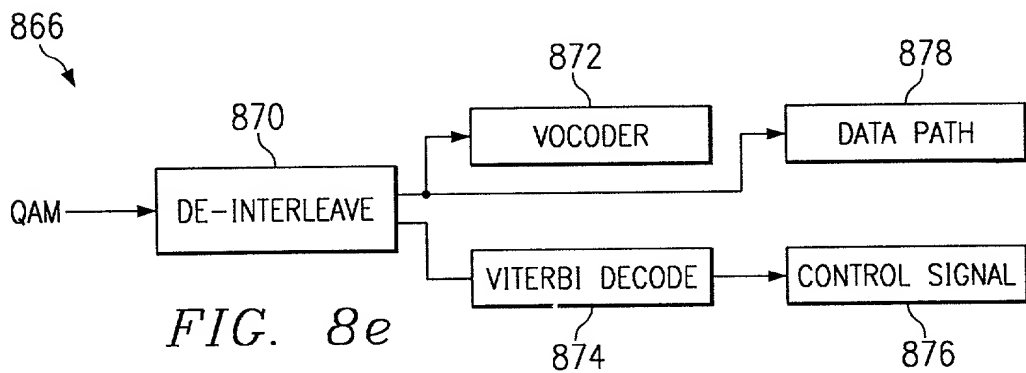
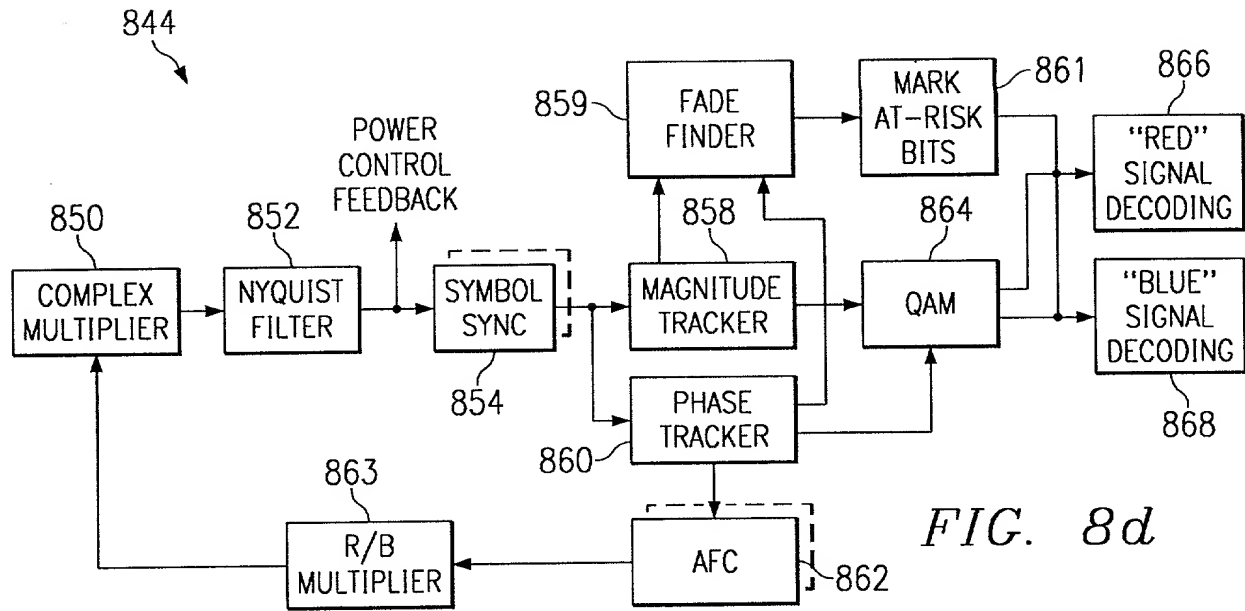


FIG. 9a

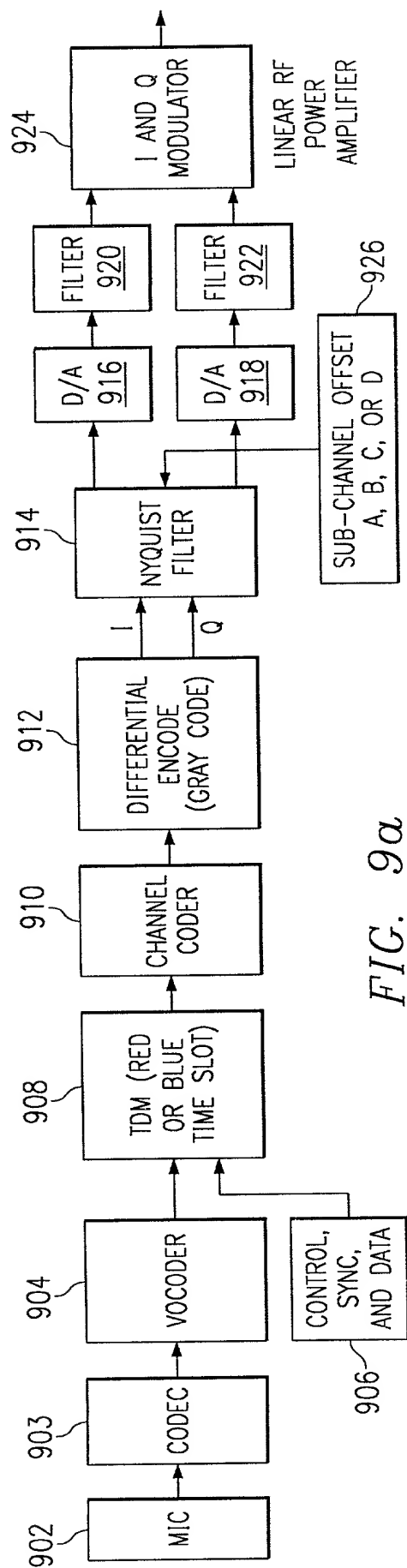


FIG. 9a

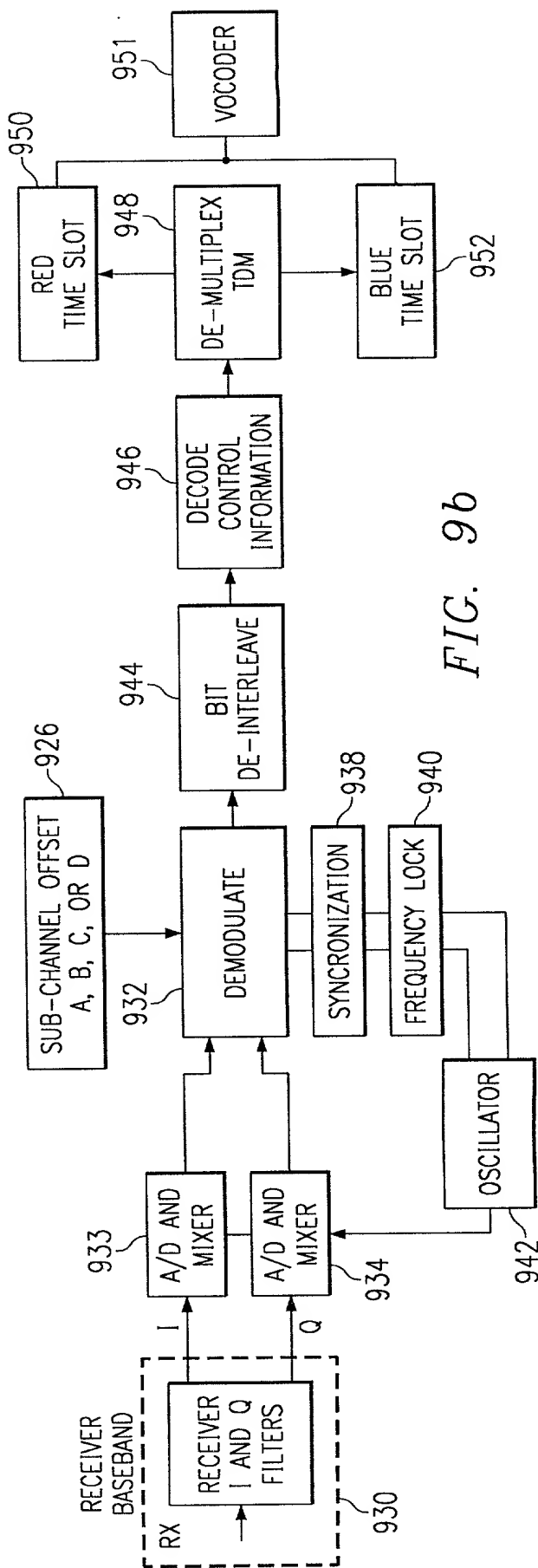


FIG. 9b

FIG. 10

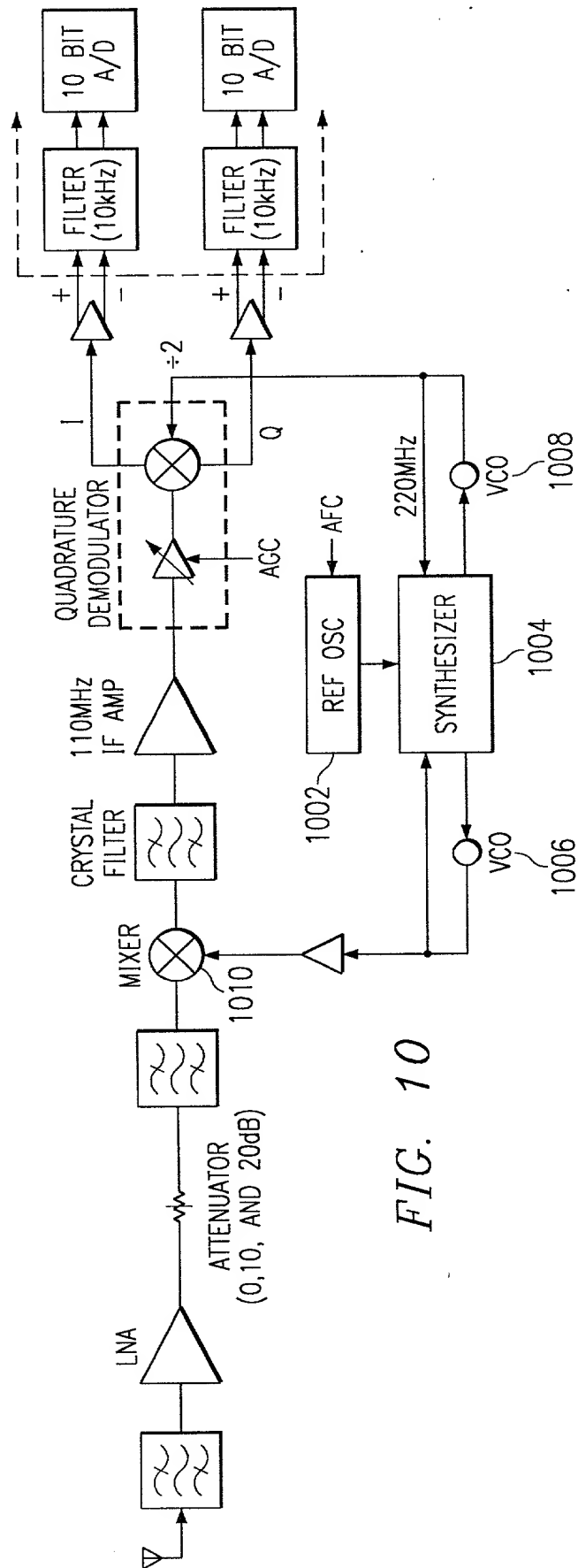


FIG. 10